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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,085	12/19/2001	Cher Huan Tan	2085-00600 (IME-P002US)	4906
23505	7590	11/01/2004	EXAMINER	
CONLEY ROSE, P.C. P. O. BOX 3267 HOUSTON, TX 77253-3267			NGUYEN, THANH T	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/025,085

Applicant(s)

TAN ET AL.

Examiner

Thanh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 8/4/04 have been fully considered but they are not persuasive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-5 are stand rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Patent No. 6,323,123) in view of Ding (U.S. Patent No. 5,981,145) as previously applied.

Referring to figures 2A-2J, teaches in a via-first dual damascene process involving the use of a low-K dielectric material as an insulation layer on a wafer substrate during the fabrication of an integrated circuit, a method for photolithographic patterning comprising the steps of:

Covering the walls of an aperture (270, figure 2D-2E) etched into an insulation layer (230/235/240/250) on a wafer substrate (200) with a fill-in material (280) for isolating a portion of the insulation layer in the aperture from a photoresist layer (300) deposited thereafter, the fill-

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in material being chemically inert to the low-K dielectric material of the insulation layer (see col. 5, lines 22-30);

Depositing anti-reflective material (290, see figure 2F, col. 4, lines 49-58) onto the insulation layer for forming a sacrificial layer thereon, and being in contact with the fill-in material (280), wherein the fill-in material (spin on glass) and the anti-reflective material (preventing the glisten of surface) have different material properties (see col. 3, lines 8-25);

Depositing photoresist (300) on the sacrificial layer;

Exposing and developing the photoresist for providing a photoresist mask pattern for subsequent etching the insulation layer (see figure 2F, col. 4, lines 49-58); and

Removing the fill-in material from the aperture (see figure 2G, col. 4, lines 59-67).

Regarding to claim 2, the step of covering the walls of the aperture comprises the step of full filling the aperture (see figures 2E-2F).

Regarding to claim 4, the step of full filling the aperture comprises the step of full filling the aperture with a solvent based fill-in material (called spin-on-glass, see col. 4, lines 39-48).

Liu et al. teaches the method of forming the dual damascene structure by filling the aperture with solvent based fill-in material to protect the insulation layer from poisoning. However, Liu et al. does not teach the step of full filling the aperture with the solvent based fill-in material comprises the step of full filling the aperture with a water soluble fill-in material such as top antireflective coating and the specific thickness of the antireflective layer (sacrificial layer).

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Ding et al. teaches in col. 2, lines 32-65, and col. 7, lines 11-24, using the antireflective coating with water-soluble fill-in material would provide a better image transfer, a low toxicity hazard and easy for handling/transportation in photolithographic patterning method.

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would using the water soluble fill-in material as taught by Ding et al. in process of Liu et al. because the process would improving photolithographic pattern method by providing better image transfer and low toxicity hazard.

The thickness range of claim are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller*, the selection of reaction parameters such as temperature and concentration would have been obvious:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmscher* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any thickness range suitable to the method in process of Liu et al. in order to optimize the process.

Response to Arguments

Applicant's arguments filed 8/04/04 have been fully considered but they are not persuasive.

Applicant contends Ding et al. teaches fill-in material and the anti-reflective material have different material properties. In response to applicant that Liu clear teaches the limitation of the fill-in material (spin on glass) and the anti-reflective material (preventing the glisten of surface) have different material properties (see col. 3, lines 8-25). Examiner relies on Ding et al. clearly teach in col. 2, lines 32-65, and col. 7, lines 11-24, using the antireflective coating with water-soluble fill-in material to provide a better image transfer, a low toxicity hazard and easy for handling/transportation in photolithographic patterning method.

Applicant contends that examiner is applying hindsight in relation to the different material properties as the different material properties. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (571) 272-1702. The fax phone number for this Group is (571) 273-1695.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).



Thanh Nguyen
Patent Examiner
Patent Examining Group 2800

TTN